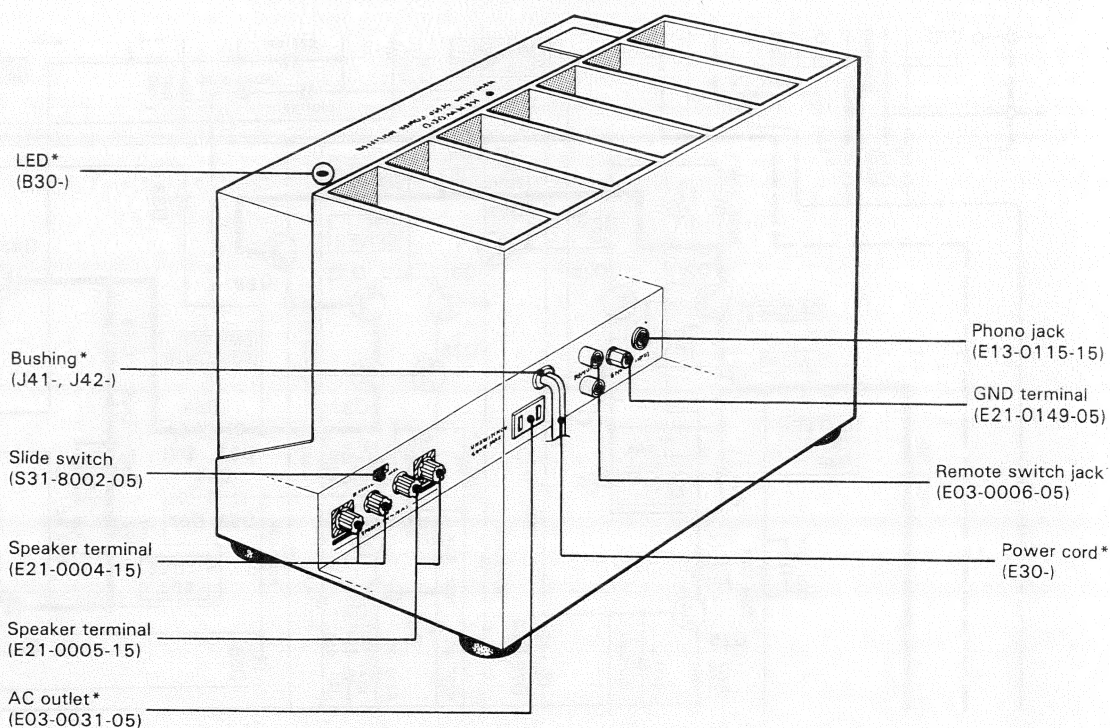
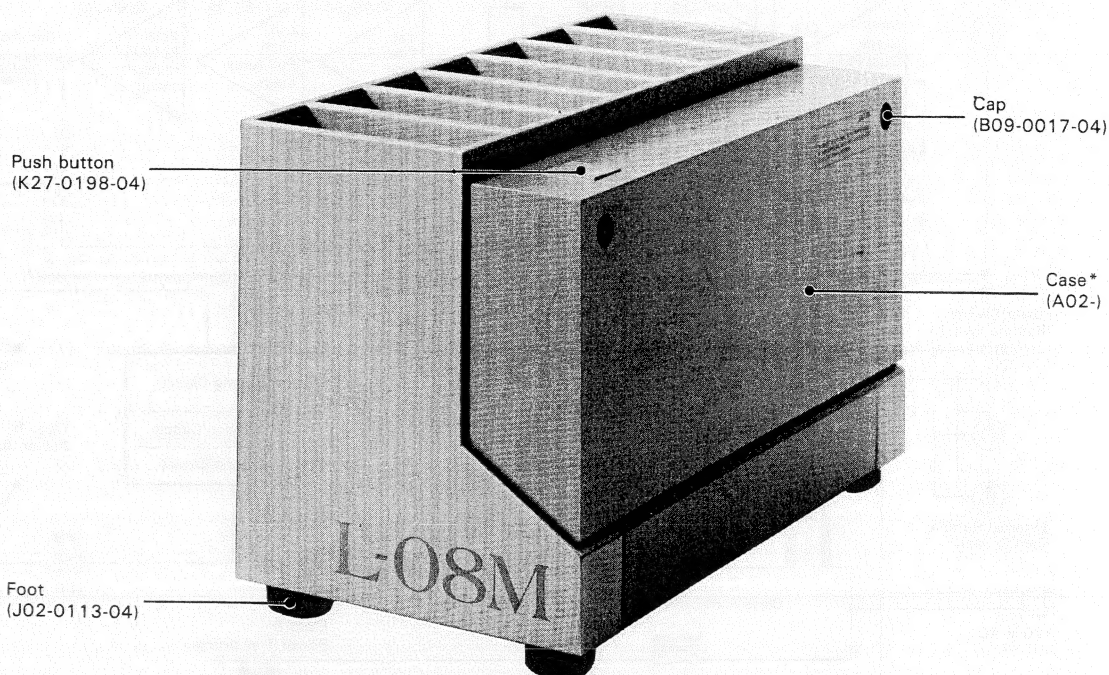




# L-08M

## NEW HIGH SPEED POWER AMPLIFIER

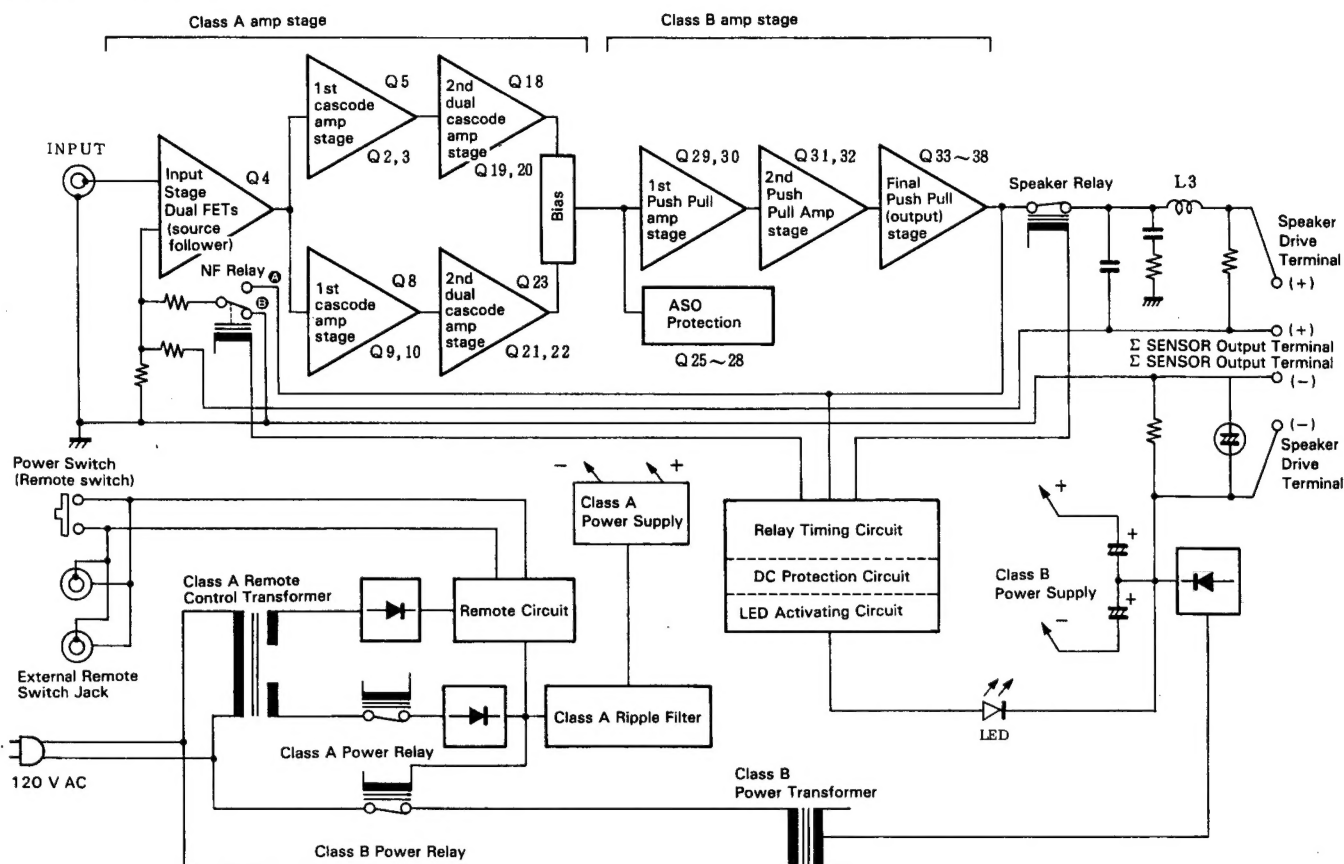
SERVICE MANUAL



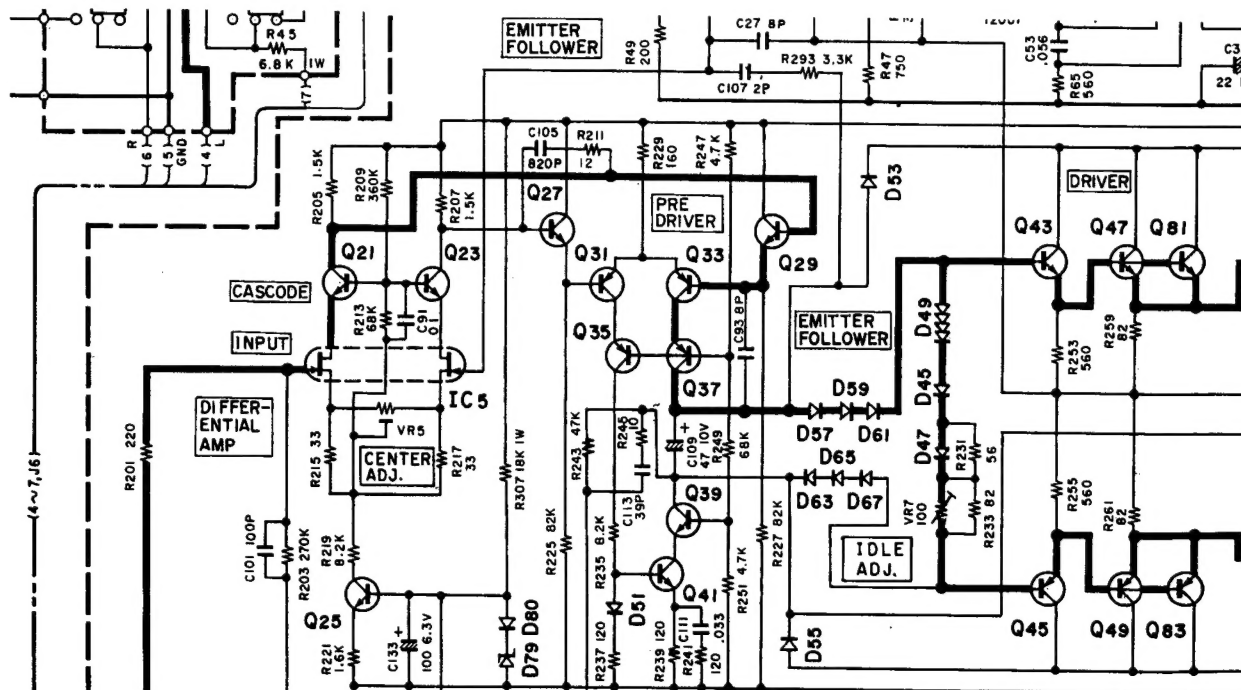
\* Refer to Parts List on page 10.

# BLOCK DIAGRAM/CIRCUIT DESCRIPTION

## BLOCK DIAGRAM

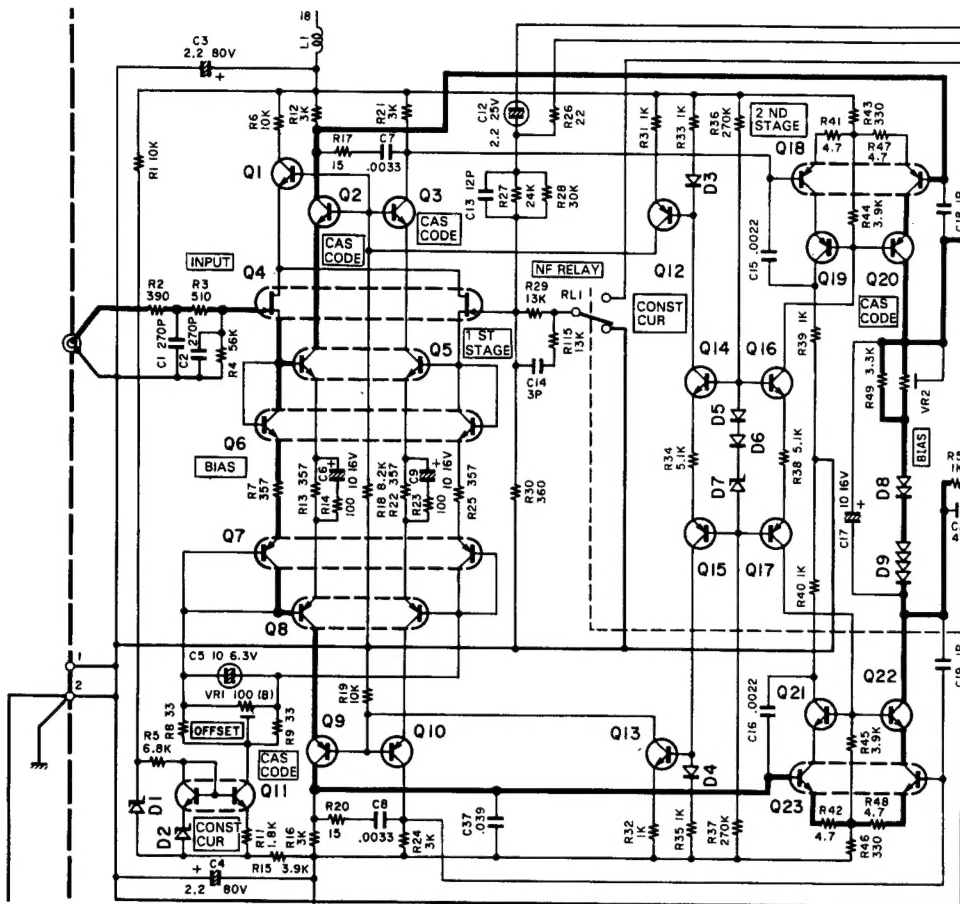


## CIRCUIT DESCRIPTION

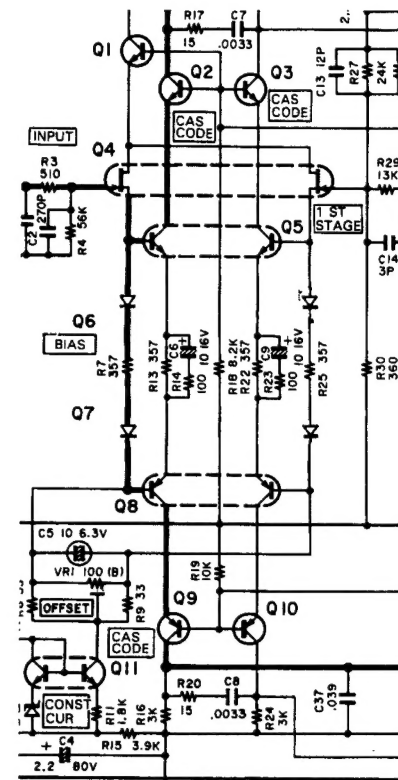


<Class-A section of conventional amp> (This schematic is KA-1000).

# CIRCUIT DESCRIPTION



< Class-A amplification stage of the L-08M >



< Partially simplified schematic of the input stage >

In the L-08M, both Class-A and Class-B amplification stages consist of symmetric circuits. The Class-A amplification stage is a dual output push-pull amplifier, featuring a gain 6 dB higher than that of the conventional circuit.

In the Class-A amplification stage, the input circuit is a source follower consisting of dual FET Q4. High voltage (70 V) is applied to the Class-A amplification stage. Although this is higher than the maximum  $V_{DS}$  (drain-source voltage) rating of Q4, the drain voltage of Q4 is dropped by connecting Q1 to form a cascode amplifier. In general, when  $V_{DS}$  applied to an FET exceeds 10 V, leak current ( $I_{GSS}$ ) increases resulting in increased noise. In this amplifier,  $V_{DS}$  is limited to about 7 V by Q1. The input signal is then divided and applied to two one-chip dual transistors, Q5 and Q8. Q5, Q2 and Q3 form a cascode amplifier whose output signal is fed to one-chip dual transistor Q18. Q8, Q9 and Q10 also form a cascode amplifier whose output signal is fed to one-chip dual transistor Q23. Q6 and Q7 are used to stabilize the bias voltage of Q5 and Q8. These transistors work as diodes. Although they may be replaced with diodes, it is difficult to obtain diodes with matching characteristics, so there is a possibility that circuit operation will become unstable because of variations in characteristics, especially the thermal characteristics will influence a great deal. Therefore, one-chip dual transistors are used to stabilize the bias.

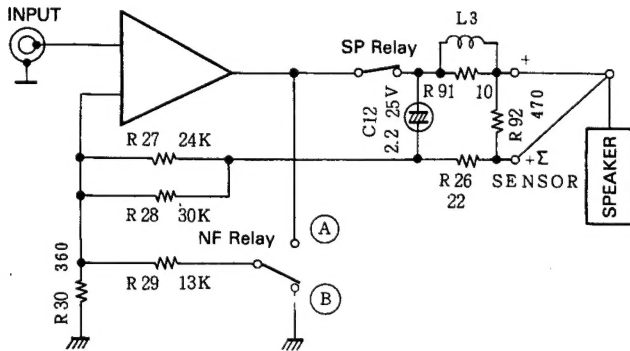
characteristics will influence a great deal. Therefore, one-chip dual transistors are used to stabilize the bias.

Q18, Q19 and Q20 form a cascode amplifier and Q23, Q21 and Q22 form another cascode amplifier. Their outputs are connected to the Class-B amplification stage. Other transistors (Q11 ~ 17) in the Class-A amplification stage are used as constant current sources. The Class-B amplification stage is an ordinary SEPP circuit. The Class-A and Class-B amplification stages are provided with individual power supplies, which are remotely turned on and off in the same manner as the remote switches of the L-07C and L-07M. The relay switching timing circuit and DC protection circuit are explained below.

## CIRCUIT DESCRIPTION

### Relay Switching Timing Circuit

Before the power is turned on, the contact of the NF relay (RL1) is connected to (A) terminal and the SP relay (RL2) is open. In the following description, this state is referred to as the relay-off state. The state where the NF relay closes the circuit to contact (B) terminal and the SP relay makes contact is referred to as the relay-on state.



When the power is turned on, power is supplied to relay drivers Q45 and Q46. The base voltage of Q43 gradually increases according to the time constant determined by R102, R103, R104 and C30. When the base voltage of Q43 reaches 1.2 V, Q43 and Q44 are turned on. Then, voltage divided by R105 and R106 is applied to the base of Q45 and it is turned on. The SP relay is then actuated, but the NF relay will be turned on after an interval determined by the time constant of C32 and R111. Let us examine the condition of the negative feedback loop just before and after the time the NF relay goes on.

When the NF relay is off, the negative feedback signal is obtained from the point just before the SP relay contact. The signal is applied to the gate of Q4 via the NF relay contact and R29. At this time, the SP relay is off and only one resistor, R29 (13 k $\Omega$ ), is included in the feedback loop. For a very

short time after the SP relay is actuated, two negative feedback loops are formed; one is that described above and the other consists of R91, R26, C12, R27 and R28.

The gain is determined by R29 and R30 immediately after the power has been turned on, and by R27, R28 and R30 after the SP and NF relays have been turned on. After both relays have been turned on, the negative feedback loop takes the following path: SP relay contact—L3//R91—(+) terminal—speaker system (+) terminal—R26—R27//R28. However high frequencies are bypassed through C12. R91 is independent of the gain. Since R26 is so much smaller than R27 and R28, it may be ignored. Then, the combined resistance of R27 and R28 is 13.3 k $\Omega$ , which is almost equal to the resistance 13 k $\Omega$  of R29. Therefore, the point where the negative feedback signal is taken is changed without change in gain by the SP and NF relays.

### DC Protection Circuit

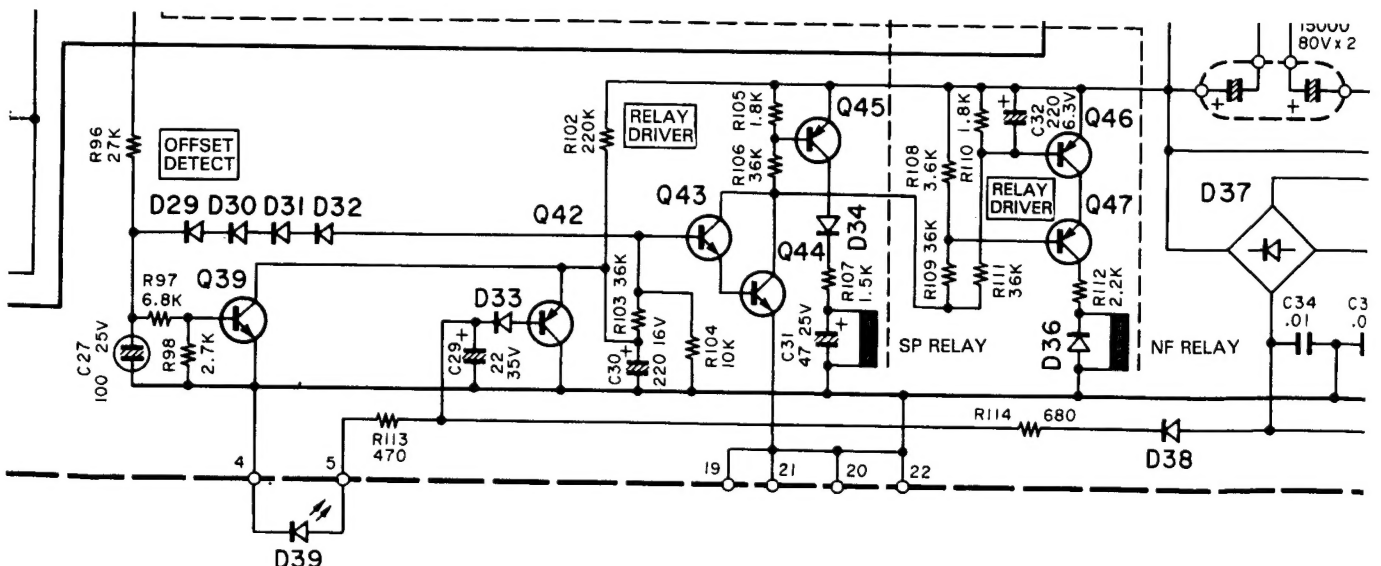
This circuit operates as follows:

- (i) When the offset voltage at the output terminal becomes positive:

The base voltage of Q39 rises through R96, R97 and R98 and Q39 goes on. Then, the base voltage of Q43 drops and Q43 is turned off to turn the SP and NF relays off.

- (ii) When the offset voltage at the output terminal becomes negative:

The base voltage of Q43 is dropped through D29 ~ D32 and the SP and NF relays are turned off.



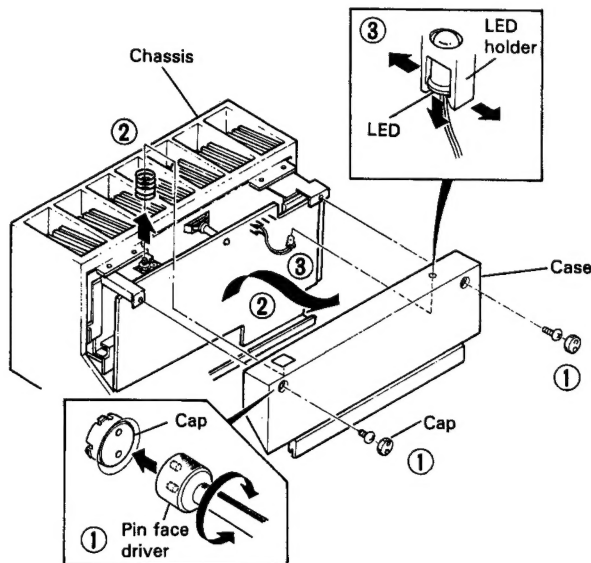
## DISASSEMBLY FOR REPAIR

### Before Disassembling:

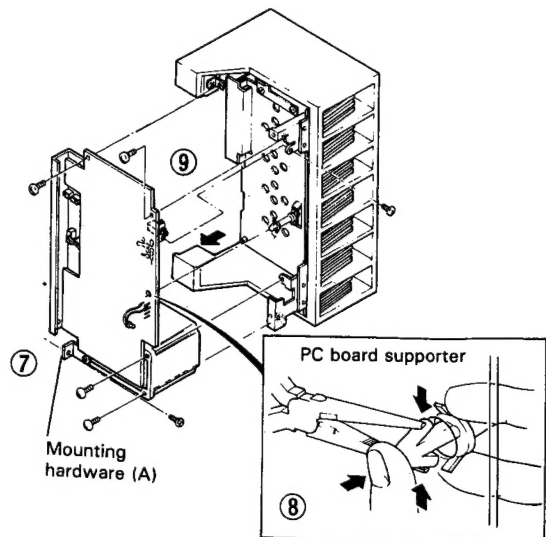
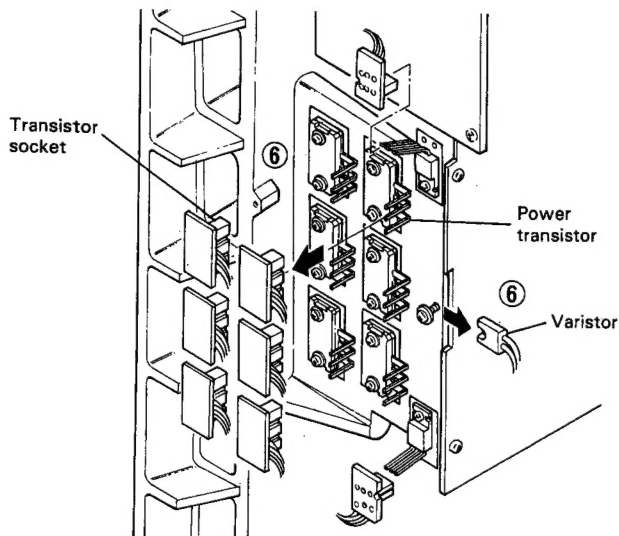
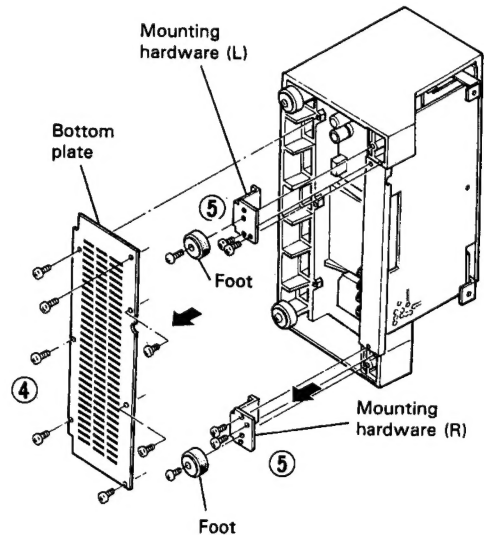
The chassis of the L-08M is made of aluminum coated with special paint. Clean the surface of the work bench and cover it with a sheet of soft cloth or something similar to prevent the chassis from being scratched.

### DISASSEMBLY

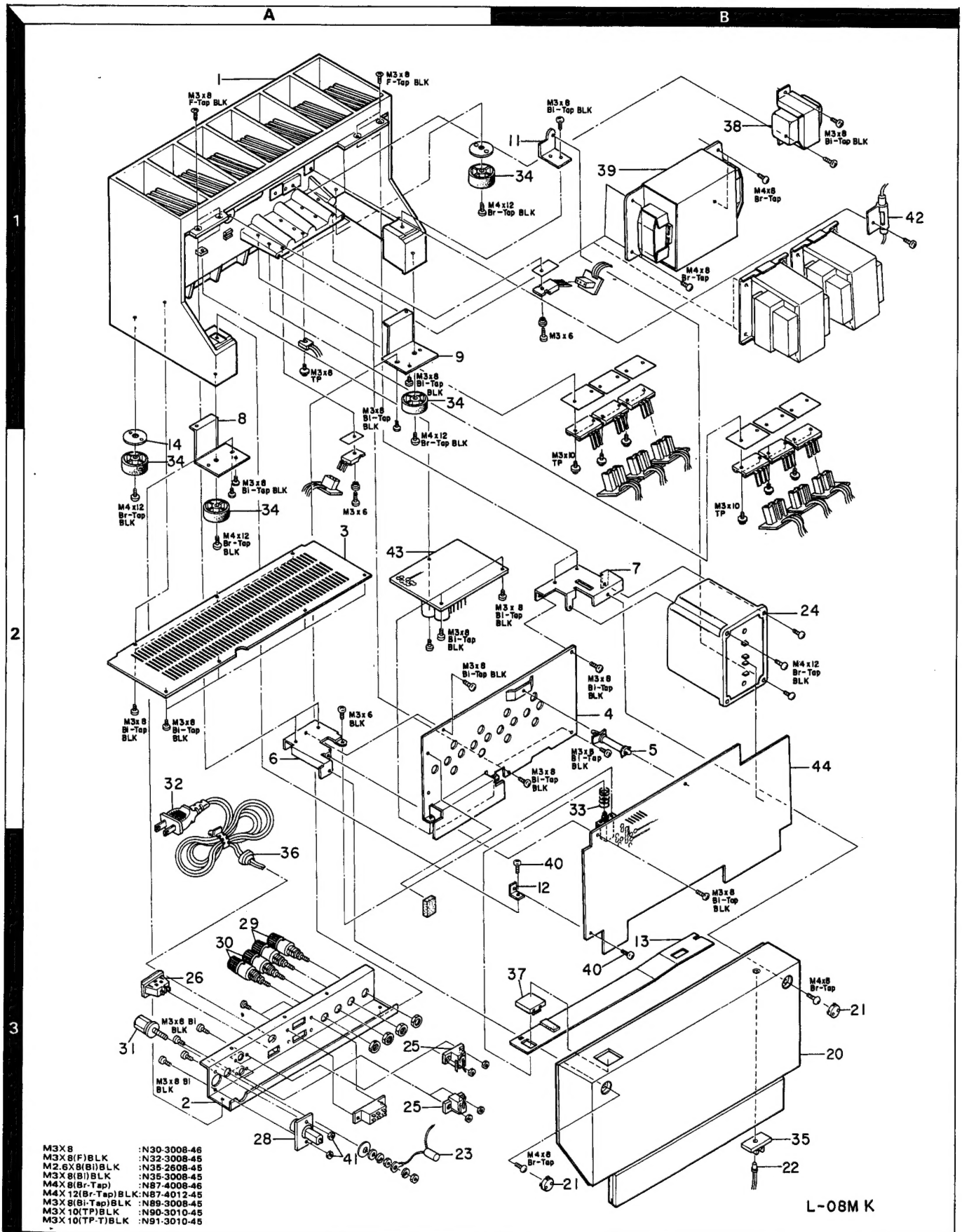
1. Remove the caps with a pin face driver, then remove the screws (①).
2. Slightly lift the case and pull it toward you, then remove it by lifting again. Be careful not to break the LED leads or lose the coil spring on the power switch (②).
3. Open the claws of the LED holder and push the LED to remove it. The case can then be completely removed (③).
4. The bottom plate can be removed by removing 7 screws. The fuse can then be replaced (④).



- The power supply PC board can be removed by removing 3 screws. Power transistors Q31 through Q38 are easily replaced after removing the transistor sockets. Use the following procedure to remove the power amp PC board.
5. Remove the 2 foots on the rear panel side and mounting hardware (L) and (R) (⑤).
  6. Remove the 8 transistor sockets. Loosen the varistor retaining screw to remove the varistor (⑥).
  7. Remove the 2 PC board retaining screws, the power switch retaining screw, the 2 electrolytic capacitor retaining screws and 1 mounting hardware (A) (⑦).
  8. Remove the PC board supporter in the manner as shown in the figure (⑧).
  9. Pull the PC board straight out to remove it. Be careful not to break any wires (⑨).



## EXPLODED VIEW



Refer to Parts List on page 10.

## ADJUSTMENT/REGLAGES/ABGLEICH

### ADJUSTMENT

#### OFFSET AND IDLE CURRENT

This adjustment must be done without dummy load connected.

1. Remove cover (refer to DISASSEMBLY FOR REPAIR).
2. Connect a DC voltmeter between TP 14 and 17.
3. Adjust VR1 for a 0V reading of the DC voltmeter (OFFSET).
4. Connect a DC voltmeter between TP 16 and 17.
5. After about 3 minutes from the time the power was turned on, adjust VR2 for a 7 ~ 8 mV reading of the DC voltmeter (IDLE CURRENT).
6. After performing these adjustments IDLE current of 60 mA will flow.

### REGLAGES

#### DECALAGE ET COURANT DE POLARISATION

Ce réglage sera effectué sans connecter l'antenne artificielle.

1. Retirer le couvercle (renvoyer au DISASSEMBLY FOR REPAIR).
2. Brancher un voltmètre de C.C. aux points d'alignement 14 et 17.
3. Régler VR1 de façon à ce que le voltmètre de C.C. indique 0V (DECALAGE).
4. Brancher un voltmètre de C.C. aux points d'alignement 16 et 17.
5. Environ 3 minutes après la mise en marche de l'appareil, régler VR2 de façon à ce que le voltmètre de C.C. indique 7 ~ 8 mV (COURANT DE POLARISATION).
6. A la suite de ces divers réglages, le passage du courant de polarisation de 60 mV sera assuré.

### ABGLEICH

#### VERSCHIEBUNG UND LEERLAUFSTROM

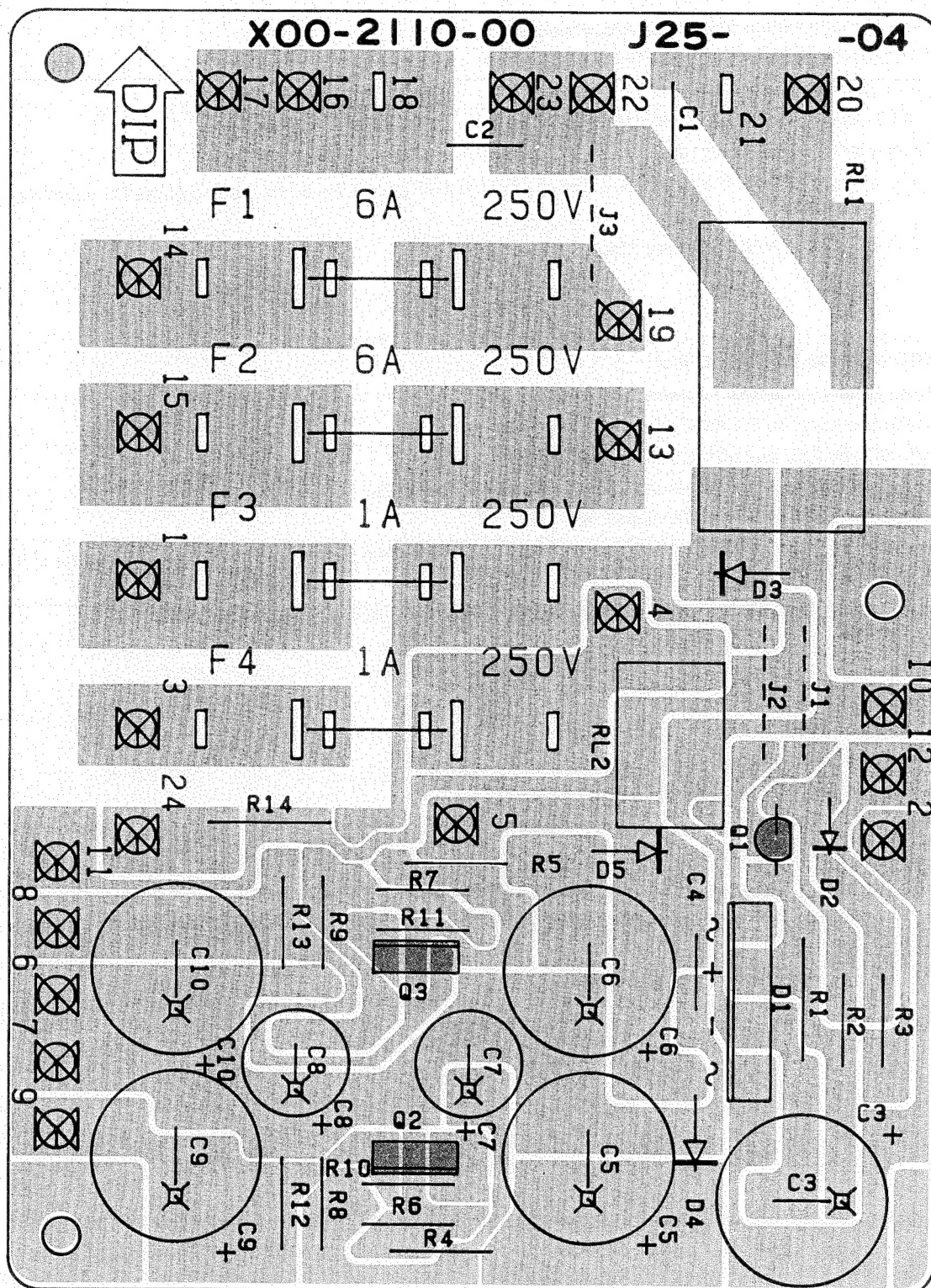
Dieser Abgleich wird ohne die künstliche Antenne anzuschließen ausgeführt.

1. Abdeckung entfernen (befragen DISASSEMBLY FOR REPAIR).
2. Einen Gleichspannungsmesser zwischen TP 14 und 17 anschließen.
3. Den VR1 so regulieren, daß die Gleichspannungsmesser-Ablesung 0V ist (VERSCHIEBUNG).
4. Eien Gleichspannungsmesser zwischen TP 16 und 17 anschließen.
5. Etwa 3 Minuten nachdem der Strom eingeschaltet wurde, den VR2 so regulieren, daß die Gleichspannungsmesser-Ablesung 7 ~ 8 mV ist (LEERLAUFSTROM).
6. Nach diesen Einstellungen fließt ein Ruhestrom von 60 mV.

Refer to PC board for DC voltmeter connection.

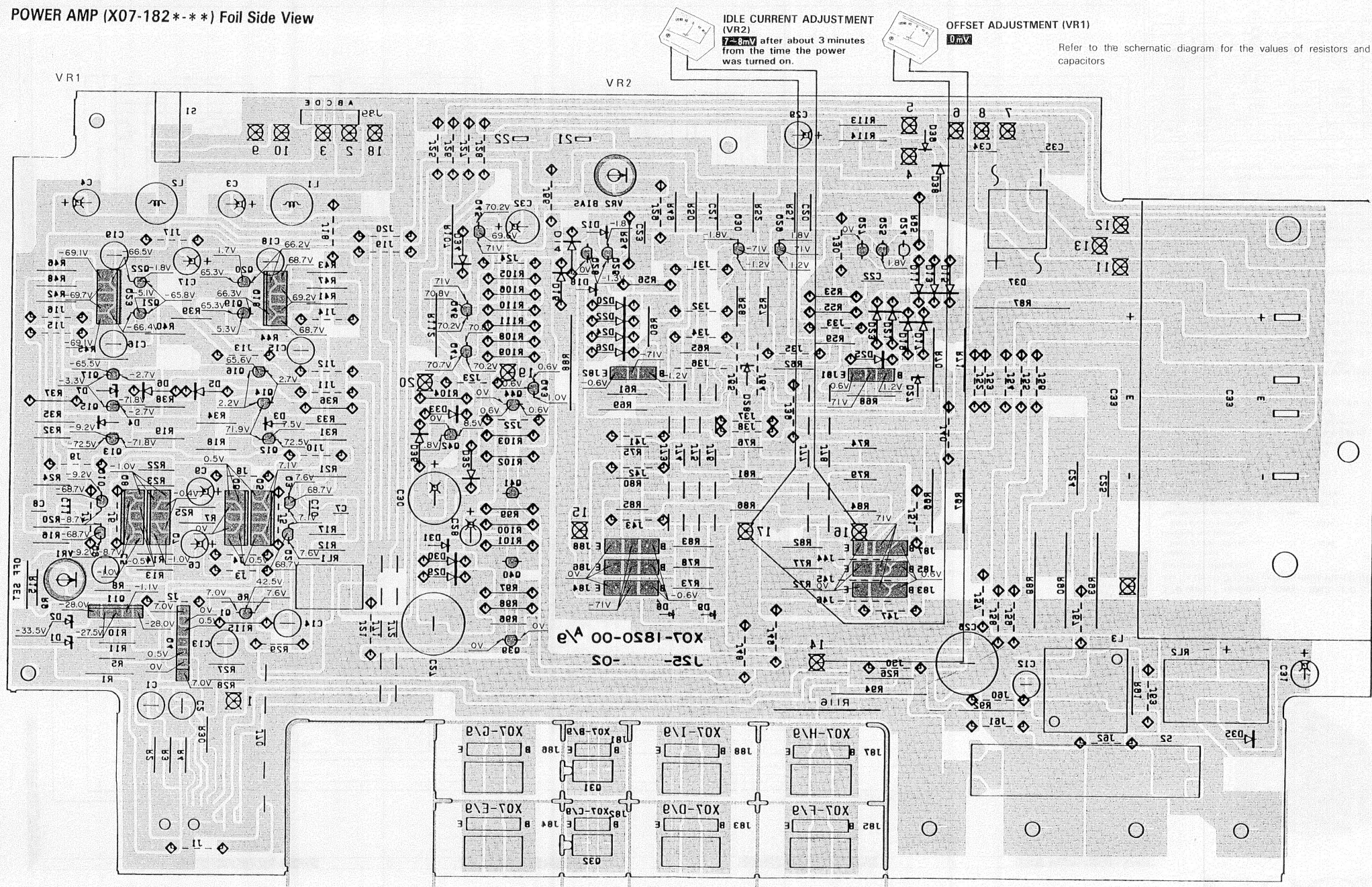
# PC BOARD

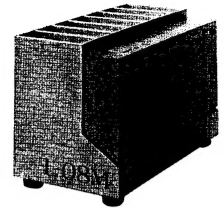
POWER SUPPLY (X00-2110-\*\*) Component Side View



Refer to the schematic diagram for the values of resistors and capacitors.

POWER AMP (X07-182\*-\*\*) Foil Side View





## SPECIFICATIONS

### POWER AMPLIFIER SECTION

#### Power Output

170 watts\* minimum power, RMS at 8 ohms from 20 Hz to 20,000 Hz with no more than 0.003% total harmonic distortion.

Continuous Power	170 W
Dynamic Power Output	400 W
Total Harmonic Distortion (20 Hz to 20 kHz)	0.003%
rated power into 8 ohms at 1,000 Hz	0.001%
Intermodulation Distortion (80 Hz: 7 kHz: 4: 1)	0.001%
rated power into 8 ohms	0.001%
Transient Response	0.001%
Rise Time	0.5 μs
Slew Rate	200 V/μs
Damping Factor	15,000 at 55 Hz
Input Sensitivity/Impedance	1 V/50 kohms
Signal-to-Noise Ratio (IHF-A)	116 dB
Frequency Response	DC to 600 kHz +0 dB, -3.0 dB

### GENERAL

Power Consumption	4.2 A (UL and CSA)
	560 W (IEC)
	40 W (No Signal)
AC Outputs	Unswitched 1
Dimensions	W: 185 mm (7-9/32")
	H: 238 mm (9-1/4")
	D: 369 mm (14-1/2")
Weight (Net)	12.5 kg (27.5 lb)
(Gross)	14.0 kg (30.8 lb)

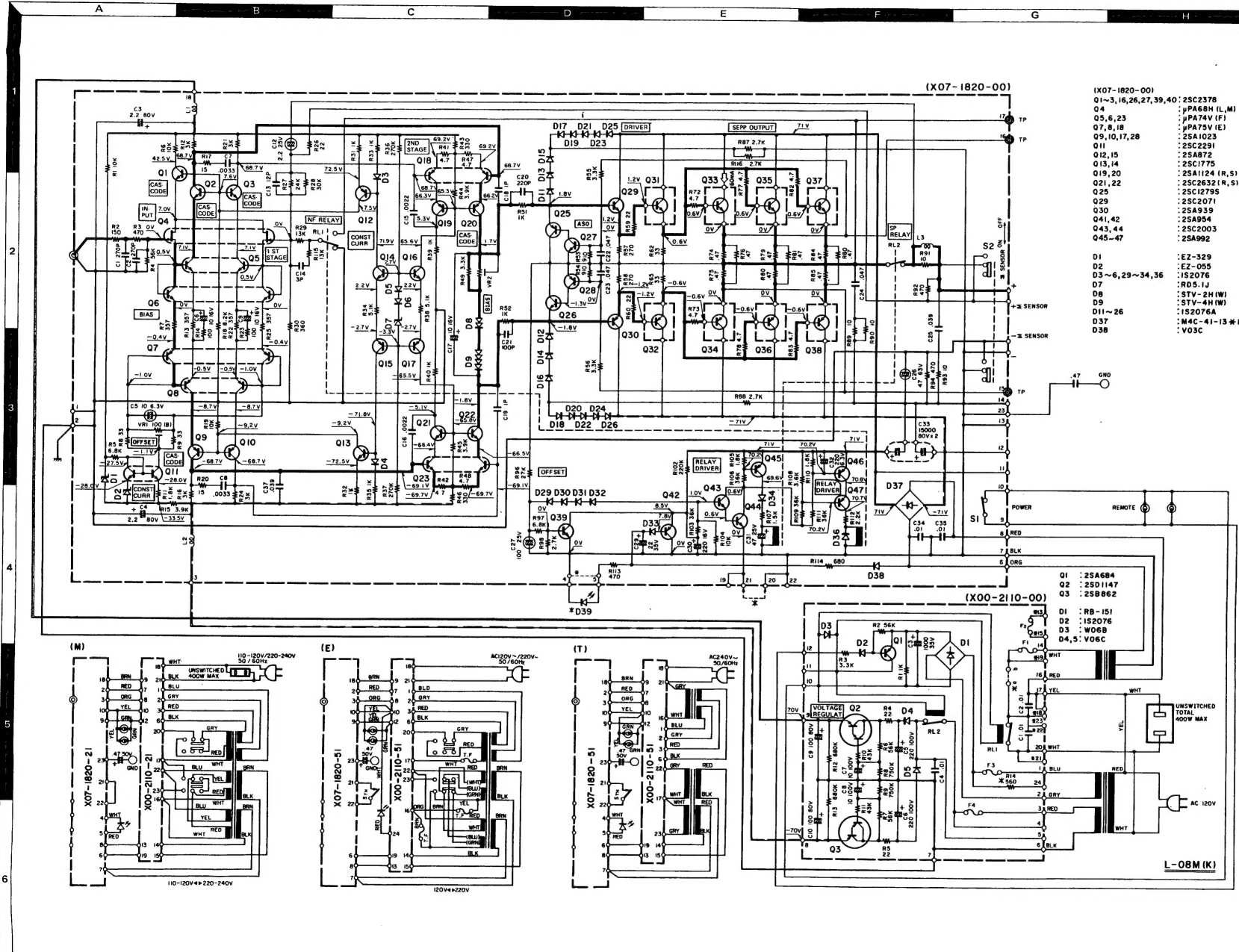
\*Measured pursuant to Federal Trade Commission's Trade Regulation rule on Power Output Claims for Amplifier in U.S.A.

Kenwood follows a policy of continuous advancements in development. For this reason specifications may be changed without notice.

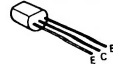
Kenwood poursuit une politique de progrès constants en ce qui concerne le développement. Pour cette raison, les spécifications sont sujettes à modifications sans préavis.

Kenwood strebt ständige Verbesserungen in der Entwicklung an. Daher bleiben Änderungen der technischen Daten jederzeit vorbehalten.

Parts	Type	K	P	E	T
POWER AMP (X07-182+...)					
Between terminal 4 and 5	Open	Open	Open	Short	
Between terminal 20 and 21	Open	Short	Open	Open	
POWER SUPPLY (X00-211+...)					
Terminal 13, 15, 18, 19, 21, 22, 23	No	No	Yes	Yes	
Between a and b	Short	Short	Open	Open	
F2	No	No	Yes	Yes	
R14	No	No	No	Yes	



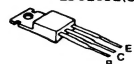
2SA684  
2SC1279S



2SA939(V)  
2SC2071(V)



2SA1112(S)  
2SC2592(S)



2SB862(F)  
2SD1147(F)



2SA1095\*1(Y)  
2SC2565\*1(Y)



2SC2291(G,H)







μPA74V(E)  
μPA75V(E)



DC voltages are measured by a VOM with 25 kΩ/V input impedance.

# PARTS LIST

Ref. No. 参照番号	Parts No. 部品番号	Description 部品名 / 規格	Re- marks 備考
<b>L-08M UNIT</b>			
1 1A	-	CHASSIS	
2 3A	-	REAR PANEL	
3 2A	-	BOTTOM PLATE	
4 2B	-	SHIELDING PLATE	
5 2B	-	PC BOARD SUPPORTER	
6 2A	-	MOUNT HARD(SWITCH)	
7 2B	-	MOUNT HARD(CAPACITOR)	
8 2A	-	MOUNTING HARDWARE(L)	
9 1A	-	MOUNTING HARDWARE(R)	
11 1B	-	MOUNTING HARDWARE(A)	
12 3B	-	MOUNTING HARDWARE(B)	
13 3B	-	MOUNTING HARDWARE(KNOB)	
14 2A	-	SPACER	
20 3B	A02-0074-02	CASE	*K
20 3B	A02-0074-02	CASE	PM
20 3B	A02-0075-02	CASE	*T
20 3B	A02-0076-02	CASE	*E
-	B46-0055-30	WARRANTY CARD	P
-	B46-0060-00	WARRANTY CARD	T
-	B46-0061-30	WARRANTY CARD	K
-	B50-3292-00	INSTRUCTION MANUAL	*K
-	B50-3293-00	INSTRUCTION MANUAL	*P
-	B50-3293-00	INSTRUCTION MANUAL	M
-	B50-3294-00	INSTRUCTION MANUAL	*T
-	B50-3295-00	INSTRUCTION MANUAL	*E
21 3B	B09-0017-04	CAP	*K
D39	B30-0267-05	LED 	*K
D39	B30-0267-05	LED 	PM
D39	B30-0267-05	LED 	T
D39	B30-0268-05	LED 	*E
23 3A	C24-1210-69	ELECTRO 10UF 16WV	
24 2B	C90-0467-05	ELECTRO 1500UF 80WV	*
-	E30-0594-05	REMOTE CORD	
-	E30-0679-05	SPEAKER CORD	
25 3A	E03-0006-05	REMOTE SWITCH JACK	
26 3A	E03-0031-05	AC OUTLET	KP
26 3A	E03-0031-05	AC OUTLET	MT
28 3A	E13-0115-15	PHONE JACK	
29 3A	E21-0004-15	SPEAKER TERMINAL(RED)	
30 3A	E21-0005-15	SPEAKER TERMINAL(BLK)	
31 3A	E21-0149-05	GND TERMINAL	
32 3A	E30-0290-05	POWER CORD	KP
32 3A	E30-0580-05	POWER CORD	E
32 3A	E30-0587-05	POWER CORD	T
32 3A	E30-0684-05	POWER CORD	M
-	F20-0078-05	INSULATOR	
33 2B	G01-0407-04	COIL SPRING	*
-	H01-3243-04	CARTON BOX	*T
-	H01-3244-04	CARTON BOX	*K
-	H01-3244-04	CARTON BOX	PM
-	H01-3247-04	CARTON BOX	*E
-	H10-1568-02	POLYSTYRENE FIXTURE	*
-	H10-1569-02	POLYSTYRENE FIXTURE	*
-	H25-0078-04	BAG 235X315	
-	J61-0045-15	WIRE BAND	
34 1B, 2A	J02-0113-04	FOOT X4	*
35 3B	J19-0509-04	LED HOLDER	
36 3A	J41-0033-05	BUSHING	TE

Ref. No. 参照番号	Parts No. 部品番号	Description 部品名 / 規格	Re- marks 備考
36 3A	J42-0078-05	BUSHING	KP
36 3A	J42-0078-05	BUSHING	M
37 3B	K27-0198-04	PUSH BUTTON	*
38 1B	L01-2251-05	POWER TRANSFORMER	*K
38 1B	L01-2252-05	POWER TRANSFORMER	*T
38 1B	L01-2255-05	POWER TRANSFORMER	*M
38 1B	L01-2256-05	POWER TRANSFORMER	*E
38 1B	L01-2257-05	POWER TRANSFORMER	*P
39 1B	L01-2261-05	POWER TRANSFORMER	*K
39 1B	L01-2262-05	POWER TRANSFORMER	*T
39 1B	L01-2265-05	POWER TRANSFORMER	*M
39 1B	L01-2266-05	POWER TRANSFORMER	*E
39 1B	L01-2267-05	POWER TRANSFORMER	*P
40 3B	N09-0301-05	SCREW(MOUNT HARD(L))	
41 3A	N10-2030-46	HEX NUT(REMOTE JACK)	
42 3B	S31-2053-05	VOLTAGE SELECTOR	ME
43 1B	S59-1051-05	THERMAL SWITCH	E
Q31	V03-2592-30	2SC2592(S) OR	*
Q31	V03-2592-30	2SC2592(R) OR	*
Q31	V03-2592-30	2SC2592(Q) OR	*
Q32	V01-1112-30	2SA1112(S) OR	*
Q32	V01-1112-30	2SA1112(R) OR	*
Q32	V01-1112-30	2SA1112(Q) OR	*
Q33	V03-2565-60	2SC2565*1(Y) OR	*
Q33	V03-2565-60	2SC2565*1(O) OR	*
Q33	V03-2565-60	2SC2565*1(R) OR	*
Q34	V01-1095-50	2SA1095*1(Y) OR	*
Q34	V01-1095-50	2SA1095*1(O) OR	*
Q34	V01-1095-50	2SA1095*1(R) OR	*
Q35	V03-2565-60	2SC2565*1(Y) OR	*
Q35	V03-2565-60	2SC2565*1(O) OR	*
Q35	V03-2565-60	2SC2565*1(R) OR	*
Q36	V01-1095-50	2SA1095*1(Y) OR	*
Q36	V01-1095-50	2SA1095*1(O) OR	*
Q36	V01-1095-50	2SA1095*1(R) OR	*
Q37	V03-2565-60	2SC2565*1(Y) OR	*
Q37	V03-2565-60	2SC2565*1(O) OR	*
Q37	V03-2565-60	2SC2565*1(R) OR	*
Q38	V01-1095-50	2SA1095*1(Y) OR	*
Q38	V01-1095-50	2SA1095*1(O) OR	*
Q38	V01-1095-50	2SA1095*1(R) OR	*
44 2A	X00-2110-11	POWER SUPPLY PCB ASSY	*K
44 2A	X00-2110-21	POWER SUPPLY PCB ASSY	*M
44 2A	X00-2110-51	POWER SUPPLY PCB ASSY	*T
44 2A	X00-2110-51	POWER SUPPLY PCB ASSY	E
44 2A	X00-2111-01	POWER SUPPLY PCB ASSY	*P
45 3B	X07-1820-11	POWER AMP PCB ASSY	*K
45 3B	X07-1820-21	POWER AMP PCB ASSY	*M
45 3B	X07-1820-21	POWER AMP PCB ASSY	TE
45 3B	X07-1821-01	POWER AMP PCB ASSY	*P
<b>POWER SUPPLY (X00-211 *-***)</b>			
C1 ,2	C91-0023-05	CERAMIC 0.01UF AC250V	
C1 ,2	C91-0079-05	CERAMIC 0.01UF AC125V	
C3	C24-6510-81	ELECTRO 1000UF 35WV	
C4	C54-2710-39	CERAMIC 0.01UF P	
C5 ,6	C24-2022-77	ELECTRO 220UF 100WV	
C7 ,8	C90-0551-05	ELECTRO 10UF 100WV	
C9 ,10	C90-0524-05	ELECTRO 100UF 80WV	
F1 ,2	F05-6021-05	FUSE	M

## PARTS LIST

Ref. No. 参照番号	Parts No. 部品番号	Description 部品名 / 規格	Re- marks 備考
F1	F05-6024-05	FUSE	K P T M T
F1 ,2	F05-6322-05	FUSE	
F3 ,4	F05-1021-05	FUSE	
F3 ,4	F05-1023-05	FUSE	
F3 ,4	F06-1021-05	FUSE	
-	J13-0041-05	FUSE HOLDER	
-	J13-0054-05	FUSE HOLDER	
R1	R47-5410-25	FL-PROOF RS1K J 3A	
R4 ,5	R43-1222-05	FL-PROOF RD22 J 2E	
R14	R47-5456-15	FL-PROOF RS560 J 3A	
RL1	S51-1026-05	RELAY	
RL1	S51-1030-05	RELAY	
RL2	S51-1021-05	RELAY	
D1	V11-5100-60	RB-151	
D2	V11-0271-05	1S2076	
D3	V11-0295-05	W068	
D4 ,5	V11-0290-05	V03C	
Q1	V01-0143-05	2SA684(Q)	
Q2	V04-1147-30	2SD1147(F)	
Q3	V02-0862-30	2SB862(F)	
<b>POWER AMP. (X07-182***)</b>			
C1 ,2	C91-0093-05	POLYSTY 270PF J	
C3 ,4	C90-0518-05	ELECTRO 2,2UF 80WV	
C5	C90-0521-05	LL-ELEC 10UF 6,3WV	
C6	C90-0441-05	ELECTRO 10UF 16WV	
C7 ,8	C49-2033-25	MYLAR 0,0033UF J	
C9	C90-0441-05	ELECTRO 10UF 16WV	
C12	C90-0522-05	LL-ELEC 2,2UF 25WV	
C13	C91-0167-05	POLYSTY 13P F	
C14	C71-1703-01	CERAMIC 3PF C	
C15 ,16	C49-2022-25	MYLAR 2200UF J	
C17	C90-0441-05	ELECTRO 10UF 16WV	
C18 ,19	C91-0157-05	POLYSTY 1PF F	
C20	C71-1722-15	CERAMIC 220PF J	
C21	C71-1710-15	CERAMIC 100PF J	
C22 ,23	C46-1747-35	MYLAR 0,047UF J	
C24	C49-2047-35	MYLAR 0,047UF J	
C25	C49-2039-35	MYLAR 0,039UF J	
C26	C90-0555-05	NP-ELEC 47UF 63WV	
C27	C90-0519-05	LL-ELEC 100UF 25WV	
C28	C26-1747-57	NP-ELEC 4,7UF 50WV	
C29	C25-6522-67	ELECTRO 22UF 35WV	
C30	C25-1222-77	LL-ELEC 220UF 16WV	
C31	C25-1447-67	LL-ELEC 47UF 25WV	
C32	C24-0822-79	ELECTRO 220UF 6,3WV	
C34 ,35	C54-2710-39	CERAMIC 0,01UF P	
C36	C52-1715-26	CERAMIC 0,0015UF K	
C37	C49-2039-35	MYLAR 0,039UF J	
-	E02-0006-05	TRANSISTOR SOCKET	
-	E02-0007-05	TRANSISTOR SOCKET	
-	J61-0045-15	WIRE BAND	
L1 ,2	L33-0275-05	CHOKE COIL	
L3	L39-0091-05	COIL	
R1	R47-5410-35	FL-PROOF RS10K J 3A	
R2	R48-2215-15	RN 150 J 2E	
R3	R48-2247-15	RN 470 J 2E	
R4	R48-2256-35	RN 56K J 2E	
R5	R48-6268-25	RN 6,8K J 2E	
R6	R47-5410-35	FL-PROOF RS10K J 3A	
R7	R48-2357-04	RN 357 G 2E	
R8 ,9	R48-6233-05	RN 33 J 2E	
R11	R48-6218-25	RN 1,8K J 2E	
R12	R48-2230-25	RN 3K J 2E	
R13	R48-2357-04	RN 357 G 2E	
R14	R48-2210-15	RN 100 J 2E	
R15	R47-5439-25	FL-PROOF RS3,9K J 3A	
R16	R48-2230-25	RN 3K J 2E	
R17	R48-2215-05	RN 15 J 2E	
R18	R47-1282-25	FL-PROOF RD8,2K J 2E	
R19	R43-1210-35	FL-PROOF RD10K J 2E	
R20	R48-2215-05	RN 15 J 2E	
R21	R48-2230-25	RN 3K J 2E	
R22	R48-2357-04	RN 357 G 2E	
R23	R48-2210-15	RN 100 J 2E	
R24	R48-2230-25	RN 3K J 2E	
R25	R48-2357-04	RN 357 G 2E	
R26	R48-6222-05	RN 22 J 2E	
R27	R48-2224-35	RN 24K J 2E	
R28	R48-2230-05	RN 30 J 2E	
R30	R48-6236-15	RN 360 J 2E	
R31 ,32	R48-6210-25	RN 1K J 2E	
R33	R43-1210-25	FL-PROOF RD1K J 2E	
R34	R43-5251-25	FL-PROOF RD5,1K J 2E	
R35	R43-1210-25	FL-PROOF RD1K J 2E	
R38	R43-5251-25	FL-PROOF RD5,1K J 2E	
R39 ,40	R43-1210-25	FL-PROOF RD1K J 2E	
R41 ,42	R43-1247-95	FL-PROOF RD4,7 J 2E	
R43	R43-1233-15	FL-PROOF RD330 J 2E	
R44 ,45	R43-5239-25	FL-PROOF RD3,9K J 2E	
R46	R43-1233-15	FL-PROOF RD330 J 2E	
R47 ,48	R43-1247-95	FL-PROOF RD4,7 J 2E	
R49	R43-1233-25	FL-PROOF RD3,3K J 2E	
R51 ,52	R43-1210-25	FL-PROOF RD1K J 2E	
R57 ,58	R43-1227-15	FL-PROOF RD270 J 2E	
R59 ,60	R43-1222-05	FL-PROOF RD22 J 2E	
R62	R43-1233-05	FL-PROOF RD33 J 2E	
R65	R43-1233-05	FL-PROOF RD33 J 2E	
R72 ,73	R43-1247-95	FL-PROOF RD4,7 J 2E	
R74 -76	R92-0203-05	METAL-PLATE 0,15K	
R77 ,78	R43-1247-95	FL-PROOF RD4,7 J 2E	
R79 -81	R92-0203-05	METAL-PLATE 0,15K	
R82 ,83	R43-1247-95	FL-PROOF RD4,7 J 2E	
R84 -86	R92-0203-05	METAL-PLATE 0,15K	
R87 ,88	R47-5627-25	FL-PROOF RS2,7K J 3F	
R89 ,90	R47-5610-05	FL-PROOF RS10 J 3F	
R91	R47-5410-05	FL-PROOF RS10 J 3A	
R92	R47-5627-25	FL-PROOF RS470 J 3F	
R93	R47-5610-05	FL-PROOF RS10 J 3F	
R94	R47-5647-15	FL-PROOF RS470 J 3F	
R96	R48-2227-35	RN 27K J 2E	
R107	R47-5615-25	FL-PROOF RS1,5K J 3F	
R112	R47-5522-25	FL-PROOF RS2,2K J 3D	
R113	R47-5447-15	FL-PROOF RS470 J 3A	
R114	R47-5568-15	FL-PROOF RS680 J 3D	
R116	R47-5627-25	FL-PROOF RS2,7K J 3F	
VR1	R12-0502-05	TRIMMING POT, 100	
VR2	R12-0056-05	TRIMMING POT, 100	
RL1	S51-1021-05	RELAY	
RL2	S51-2040-05	RELAY	
S1	S40-2122-05	PUSH SWITCH	
S2	S31-8002-05	SLIDE SW. (SIGMA ON-OFF)	

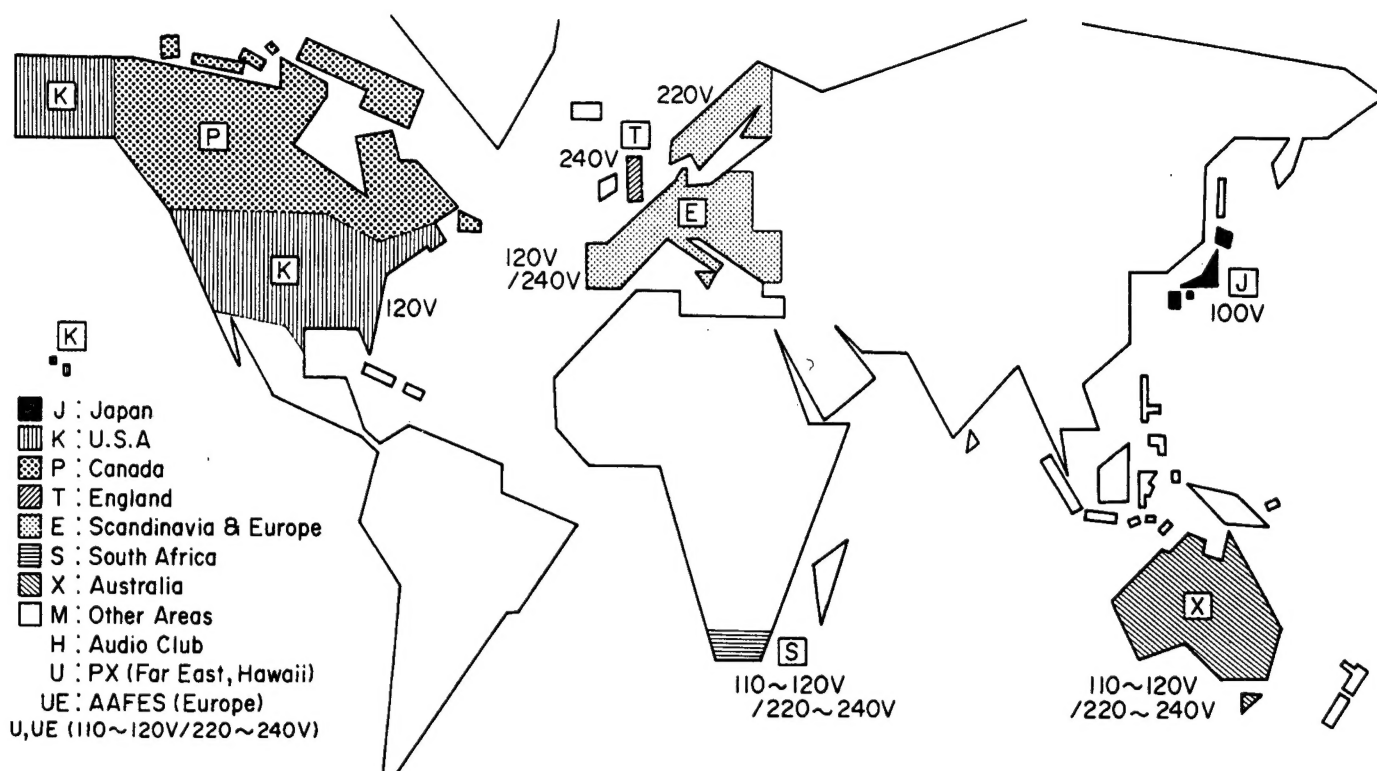
## PARTS LIST

Ref. No. 参照番号	Parts No. 部品番号	Description 部品名 / 規格	Re- marks 備考
D1	V11-4109-70	EZ-329	
D2	V11-4109-60	EZ-055	
D3 ,4	V11-0271-05	1S2076	
D5 ,6	V11-0271-05	1S2076	
D7	V11-1202-40	RD5.1J	
D8	V11-5100-80	STV-2H(W)	
D9	V11-5100-10	STV-4H(W)	
D11	V11-0273-05	1S2076A	
D12	V11-0273-05	1S2076A	
D13 -17	V11-0273-05	1S2076A	
D18	V11-0273-05	1S2076A	
D19 -26	V11-0273-05	1S2076A	
D29 ,30	V11-0271-05	1S2076	
D31	V11-0271-05	1S2076	
D32 -34	V11-0271-05	1S2076	
D36	V11-0271-05	1S2076	
D37	V11-2101-30	M4C-41-13*1	
D38	V11-0290-05	V03C	
Q1 -3	V03-2378-00	2SC2378	
Q4	V09-0145-30	UPA68H(L,M)	
Q5 ,6	V30-0550-10	UPA74V(E)	
Q7 ,8	V30-0552-10	UPA75V(E)	
Q9 ,10	V01-1023-00	2SA1023	
Q11	V03-2291-10	2SC2291	
Q12	V01-0198-05	2SA872	
Q13 ,14	V03-1775-00	2SC1775	
Q15	V01-0198-05	2SA872	
Q16	V03-2378-00	2SC2378	
Q17	V01-1023-00	2SA1023	
Q18	V30-0552-10	UPA75V(E)	
Q19 ,20	V01-1124-10	2SA1124(S)	
Q21 ,22	V03-2632-10	2SC2632(S)	
Q23	V30-0550-10	UPA74V(E)	
Q25	V03-1279-10	2SC1279S	
Q26 ,27	V03-2378-00	2SC2378	
Q28	V01-1023-00	2SA1023	
Q29	V03-2071-30	2SC2071(V)	
Q30	V01-0939-30	2SA939(V)	
Q39 ,40	V03-2378-00	2SC2378	
Q41 ,42	V01-0954-00	2SA954	
Q43 ,44	V03-2003-00	2SC2003	
Q45 -47	V01-0992-00	2SA992	

## Semiconductor Substitutions

Names	Substitutions
<b>X07-182***</b>	
1S2076	Same type with $V_{RM} \geq 35V$ and equal $C_j$ (junction capacitance) (1S1555)
1S2076A	Same type with $V_{RM} \geq 70V$ and equal $C_j$ (junction capacitance) (1S1553)
V03C	$V_{RM} \geq 200V$ , $I_o \geq 1.3A$ (U05C)
M4C-41-13*1	$V_{RM} \geq 200V$ , $I_o \geq 4.5A$
2SA 872 (D,E)	2SA992, 2SA954
2SA 992	2SA954
2SA 1023	2SA872
2SC 1775	2SC1845, 2SC2003
2SC 2378	2SC1775
<b>X00-211***</b>	
RB-151	$V_{RM} \geq 100V$ , $I_o \geq 1.5A$ (SR3AM-2)
W06B	$V_{RM} \geq 100V$ , $I_o \geq 750mA$ (V03C)
V06C	$V_{RM} \geq 200V$ , $I_o \geq 1.1A$ (V03C)
2SA 684	Same type with equal maximum $V_{CEO}$ and $P_c$ (2SA 743A)

## WORLD MAP & AREA CODE



### Note:

Component and circuitry are subject to modification to insure best operation under differing local conditions. This manual is based on, the U.S. (K) standard, and provides information on regional circuit modification through use of alternate schematic diagrams, and information on regional component variations through use of parts list.

There is no plan for producing units of K, P and S type.

A product of

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